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Sensing and Control
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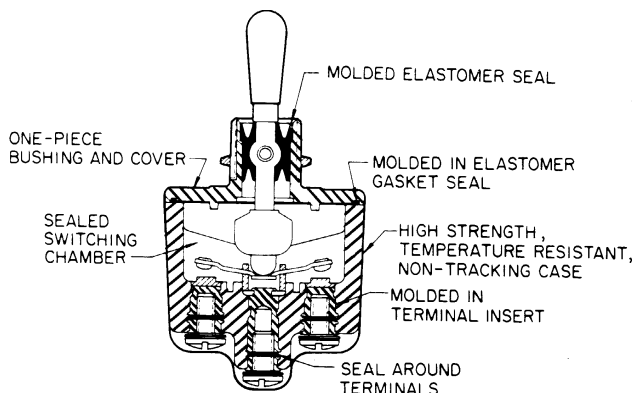
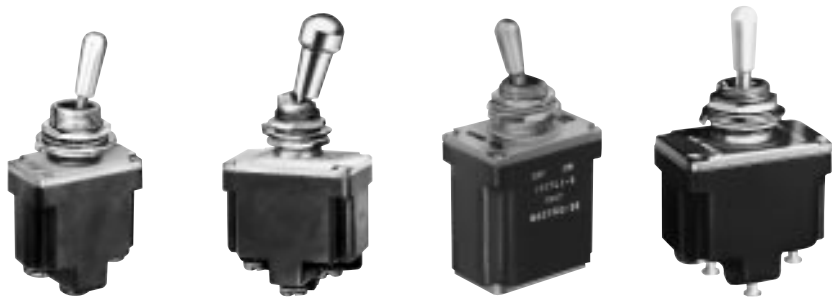
Sensing and Control
Honeywell Inc.
11 West Spring Street
Freeport, IL 61032



Manual Switches

Environment-Sealed Toggle Switches

TL Series



FEATURES

- Qualified to MIL-S-3950
- Environment-proof sealing
- 1, 2, and 4 pole circuitry
- Standard and pull to unlock levers
- 2 and 3 position, maintained, and momentary toggle action
- Temperature range: -85°F to +160°F (-65°C to +71°C)
- Screw, turret solder, and IWTS terminals available
- UL recognized
- Colored tab levers available

CONSTRUCTION

TLs have high strength, temperature resistant, non-tracking case material and silver cadmium oxide contacts. Gold contacts are also available.

ACTUATOR OPTIONS

Standard toggle lever operates on a direct action spring loaded toggle mechanism to provide excellent tactile feedback in both the momentary and maintained toggle positions. The toggle lever is approximately .68 in. (16mm) long and has a non-glare matte nickel plated finish.

Pull-to-unlock toggle levers prevent accidental toggle movement. The knobbed toggle lever must be pulled out approximately .09 in. (2.3mm) to change positions. Thirteen different locking configurations are available. This lever style also has a non-glare matte nickel finish.

ELECTRICAL RATINGS In Amperes

Rating Code*	28 Volts DC			115 VDC	250 VDC	115 Volts AC 60 & 400 Hz			230 VAC
	Ind.	Res.	Lamp	Res.	Res.	Ind.	Res.	Lamp	Res.
1	12	20	5	0.75	0.5	10	15	3	6
2	10	15	4	0.75	0.5	7	15	2	6
3	15	20	7	0.75	0.5	15	15	4	6
4	10	18	5	0.75	0.5	8	11	2	6
5	12	20	5	0.75	0.5	15	15	4	6
6	10	18	4	0.75	0.5	8	11	2	6

UL AND CSA ELECTRICAL RATINGS

Rating Code*	Electrical Rating
L192	10 amps-125, 250, 277 VAC; ¼ HP-125 VAC; ½ HP-250, 277 VAC 3 amps-125 VAC "L"
L191	15 amps-125, 250, 277 VAC; ½ HP-125 VAC; 1 HP-250, 277 VAC 5 amps-125 VAC "L"

* Referred to in order guides.

Application Note: Honeywell MICRO SWITCH does *not* recommend the use of silver cadmium oxide switch contacts in non-arcing loads. Non-arcing loads are generally loads less than 12 volts and/or 0.5 amp. TL switches use silver cadmium oxide contact. If you have specific questions, contact the MICRO SWITCH Application Center at 1-800-537-6945.

Manuals

Manual Switches

Environment-Sealed Toggle Switches

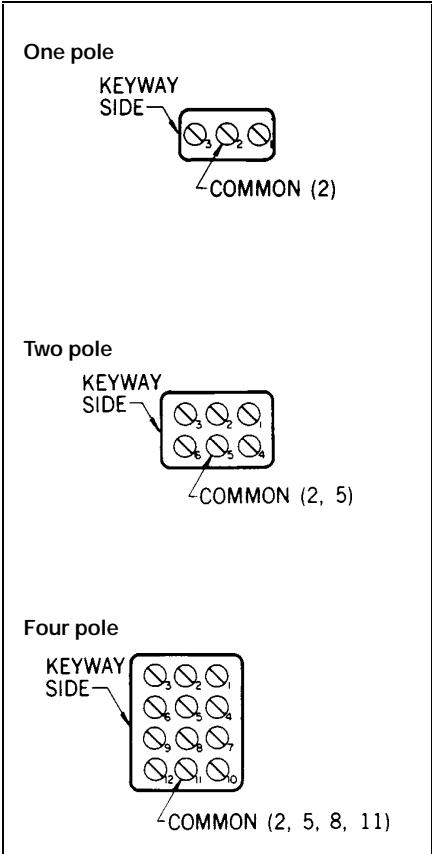
TERMINAL CIRCUIT IDENTIFICATION

Terminal identifications are referred to in the order guides to indicate which circuits are made in each toggle position (i.e., 1-2 refers to circuit closure through terminals 1 and 2).

SPECIAL CIRCUITRIES

Catalog listings with -10, -50, and -70 suffix numbers shown in the order guides have special "On-On-On" circuits, as illustrated. TLs with -12 suffix are the same as -50 except the keyway position is main-

tained, and in the center position circuits 2-3 and 4-5 are made; -72 is the same as -50 except that the opposite keyway position is momentary, and in the center position circuits 2-3 and 4-5 are made.



-10 CIRCUITRY

No. of Poles	Keyway Side Maint. Position	Center Maint. Position	Opposite Keyway Maint. Position
2			
4			

-50 CIRCUITRY

No. of Poles	Keyway Side Mom. Position	Center Maint. Position	Opposite Keyway Maint. Position
2			
4			




-70 CIRCUITRY

No. of Poles	Keyway Side Mom. Position	Center Maint. Position	Opposite Keyway Mom. Position
2			
4			

Manual Switches

Environment-Sealed Toggle Switches

TL 2-POSITION ORDER GUIDE














	No. of Poles	Circuit(s) Made With Toggle At:		Page 39		Standard Toggle		Pull-to-Unlock Toggle Locking Configuration	
		Keyway Position	Opposite Keyway	Electrical Rating Code	UL/CSA Rating Code	Catalog Listing	Military Number	Add Suffix to Standard Toggle Listing	Military Number**
	1	OFF OFF* 1-2* 1-2 1-2*	2-3 2-3 OFF 2-3 2-3	1 2 2 1 2	L191 L192 L192 L191 L192	1TL1-2 1TL1-4 1TL1-6 1TL1-3 1TL1-8	MS24523-22 MS24523-29 MS24523-30 MS24523-23 MS24523-26	D, F, G F F D, F, G F	MS24658-22 MS24658-29 MS24658-30 MS24658-23 MS24658-26
	2	OFF OFF* 1-2, 4-5* 1-2, 4-5 1-2, 4-5*	2-3, 5-6 2-3, 5-6 OFF 2-3, 5-6 2-3, 5-6	3 4 4 3 4	L191 L192 L192 L191 L192	2TL1-2 2TL1-4 2TL1-6 2TL1-3 2TL1-8	MS24524-22 MS24524-29 MS24524-30 MS24524-23 MS24524-26	D, F, G F F D, F, G F	MS24659-22 MS24659-29 MS24659-30 MS24659-23 MS24659-26
	4	OFF OFF* 1-2, 4-5 7-8, 10-11* 1-2, 4-5 7-8, 10-11 1-2, 4-5* 7-8, 10-11	2-3, 5-6 8-9, 11-12 2-3, 5-6 8-9, 11-12 OFF 2-3, 5-6 8-9, 11-12 2-3, 5-6 8-9, 11-12	5 6 6 5 6	L191 L192 L192 L191 L192	4TL1-2 4TL1-4 4TL1-6 4TL1-3 4TL1-8	MS24525-22 MS24525-29 MS24525-30 MS24525-23 MS24525-26	D, F, G F F D, F, G F	MS24660-22 MS24660-29 MS24660-30 MS24660-23 MS24660-26

* These positions only are momentary. All others are maintained.
 ** Also add the appropriate suffix letter to the Military number.

PULL-TO-UNLOCK OPTION

When ordering pull-to-unlock toggle listings, add the suffix letter shown in the chart below to the standard toggle listing and the MS number. For example, to order a 1TL1-1 pull-to-unlock toggle switch with the lever locked in the center position, add the letter E; i.e., 1TL1-1E, MS-24658-21E.

LOCKING CONFIGURATIONS

 Locked In Three Positions	 Locked In Center and Extreme Position (Keyway Side)	 Locked Out Of Center Position	 Locked In Center Position	 Locked In Extreme Position (Opposite Keyway)	 Locked In Extreme Position (Keyway Side)	 Locked Out Of Center And Extreme Position (Keyway Side)
 Locked Out Of Center And Extreme Position (Opposite Keyway)	 Locked In Center And Extreme Position (Opposite Keyway)	 Locked Out Of Extreme Position (Keyway Side)	 Locked Out Of And Into Extreme Position (Opposite Keyway)	 Locked Out Of Extreme Position (Opposite Keyway)	 Locked Out Of And Into Extreme Position (Keyway Side)	






Manual Switches

TL Series

Environment-Sealed Toggle Switches

TL 3-POSITION ORDER GUIDE

	No. of Poles	Circuit(s) Made With Toggle At:			Page 39		Standard Toggle		Pull-to-Unlock Toggle Locking Configuration	
		Keyway Position	Center Position	Opposite Keyway	Elec. Rating Code	UL/CSA Rating Code	Catalog Listing	Military Number***	Add Suffix to Standard Toggle Listing	Military Number***
	1	1-2	OFF	2-3	1	L191	1TL1-1	MS24523-21	ALL TYPES	MS24658-21
		1-2*	OFF	2-3	2	L192	1TL1-5	MS24523-31	E, F, K, L, M, N	MS24658-31
		1-2*	OFF	2-3*	2	L192	1TL1-7	MS24523-27	E, L, N	MS24658-27
		None**	OFF	2-3	1	L191	1TL1-21	MS24523-24	E, F, K, M	MS24658-24
		None**	1-2	2-3	1	L192	1TL1-31	MS24523-33	E, F, K, M	MS24658-33
		None**	1-2	2-3*	2	L192	1TL1-51	MS24523-32	E	MS24658-32
		1-2*	OFF	None**	2	L192	1TL1-61	MS24523-28	E	MS24658-28
	2	1-2, 4-5	OFF	2-3, 5-6	3	L191	2TL1-1	MS24524-21	ALL TYPES	MS24659-21
		1-2, 4-5*	OFF	2-3, 5-6	4	L192	2TL1-5	MS24524-31	E, F, K, L, M, N	MS24659-31
		1-2, 4-5*	OFF	2-3, 5-6*	4	L192	2TL1-7	MS24524-27	E, L, N	MS24659-27
		None**	OFF	2-3, 5-6	3	L191	2TL1-21	MS24524-24	E, F, K, M	MS24659-24
		None**	1-2, 4-5	2-3, 5-6	3	L191	2TL1-31	MS24524-33	E, F, K, M	MS24659-33
		None**	1-2, 4-5	2-3, 5-6*	4	L192	2TL1-51	MS24524-32	E	MS24659-32
		1-2, 4-5*	OFF	None**	4	L192	2TL1-61	MS24524-28	E	MS24659-28
		1-2, 4-5	1-2, 5-6	2-3, 5-6	3	L191	2TL1-10	MS27407-4	ALL TYPES	MS27408-4
		1-2, 4-5*	1-2, 5-6	2-3, 5-6	4	L192	2TL1-50	MS27407-5	E, F, K, L, M, N	MS27408-5
		1-2, 4-5*	1-2, 5-6	2-3, 5-6*	4	L192	2TL1-70	MS27407-6	E, L, N	MS27408-6
			4	1-2, 4-5	OFF	2-3, 5-6	5	L191	4TL1-1	MS24525-21
7-8, 10-11	OFF			8-9, 11-12	6	L192	4TL1-5	MS24525-31	E, F, K, L, M, N	MS24660-31
1-2, 4-5	OFF			2-3, 5-6	6	L192	4TL1-7	MS24525-27	E, L, N	MS24660-27
7-8, 10-11*	OFF			8-9, 11-12	6	L192	4TL1-7	MS24525-27	E, L, N	MS24660-27
1-2, 4-5	OFF			2-3, 5-6	6	L192	4TL1-7	MS24525-27	E, L, N	MS24660-27
7-8, 10-11*	OFF			8-9, 11-12*	6	L192	4TL1-7	MS24525-27	E, L, N	MS24660-27
None**	OFF			2-3, 5-6	5	L191	4TL1-21	MS24525-24	E, F, K, M	MS24660-24
None**	1-2, 4-5			8-9, 11-12	5	L191	4TL1-31	MS24525-33	E, F, K, M	MS24660-33
None**	7-8, 10-11			8-9, 11-12	5	L191	4TL1-31	MS24525-33	E, F, K, M	MS24660-33
None**	1-2, 4-5			2-3, 5-6	6	L192	4TL1-51	MS24525-32	E	MS24660-32
None**	7-8, 10-11			8-9, 11-12	6	L192	4TL1-51	MS24525-32	E	MS24660-32
1-2, 4-5	7-8, 10-11			8-9, 11-12*	6	L192	4TL1-51	MS24525-32	E	MS24660-32
1-2, 4-5	OFF			None**	6	L192	4TL1-61	MS24525-28	E	MS24660-28
7-8, 10-11*	2-3, 4-5			2-3, 5-6	5	L191	4TL1-10	—	ALL TYPES	—
7-8, 10-11	2-3, 4-5			8-9, 11-12	5	L191	4TL1-10	—	ALL TYPES	—
1-2, 4-5	2-3, 4-5			2-3, 5-6	6	L192	4TL1-50	MS27406-2	E, F, K, L, M, N	MS27409-2
7-8, 10-11*	7-8, 11-12			8-9, 11-12	6	L192	4TL1-50	MS27406-2	E, F, K, L, M, N	MS27409-2
1-2, 4-5	2-3, 4-5	2-3, 5-6	6	L192	4TL1-70	—	E, L, N	—		
7-8, 10-11*	2-3, 4-5	8-9, 11-12*	6	L192	4TL1-70	—	E, L, N	—		
1-2, 4-5	2-3, 4-5	2-3, 5-6	5	L191	4TL1-12	MS27406-1	ALL TYPES	MS27409-1		
7-8, 10-11	7-8, 11-12	8-9, 11-12	5	L191	4TL1-12	MS27406-1	ALL TYPES	MS27409-1		
1-2, 4-5	2-3, 4-5	2-3, 5-6	6	L192	4TL1-72	MS27406-3	E, L, N	MS27409-3		
7-8, 10-11*	7-8, 11-12	8-9, 11-12*	6	L192	4TL1-72	MS27406-3	E, L, N	MS27409-3		

* These positions only are momentary. All others are maintained.
 ** Toggle lever is blocked from these positions. Toggle becomes two position, with center being one extreme position.
 *** Also add appropriate suffix letter to the Military Number.

SOLDER TURRET TERMINAL VERSION



HOW TO ORDER

11TL, 12TL, and 14TL type switches with solder turret terminals are qualified to MIL-S-3950. They have the same circuitry and electrical ratings as their 1TL, 2TL, and 4TL counterparts. For example, 11TL1-2 is the same as 1TL1-2, except it has solder turret terminals instead of screw terminals. The complete MS drawing numbers are shown in data sheet 204.

Circuitry	Type	Std. Lever	Lever Lock
One Pole	11TL	MS27734	MS27737
Two Pole	12TL	MS27735	MS27738
Four Pole	14TL	MS27736	MS27739

Manual Switches

Environment-Sealed Toggle Switches/IWTS

GENERAL INFORMATION

IWTS (Integrated Wire Termination System) provides you with a reliable, completely serviceable unit which meets MIL-S-3950 requirements. IWTS improves maintainability since wiring bundles need not be disturbed. Leads are quickly and easily assembled or removed with an insert-extract tool.

A unique three-rib (grommet style) elastomer seal protects the lead connections without potting. There are no exposed metal terminals.

Versions are available that will accept No. 16 wire with M39029/1-102 contact pins or No. 20 wire with M39029/1-101 contact pins. Connections are resistant to shock, vibration, and high pulling force.

TYPICAL APPLICATIONS

- Military and civilian aircraft and marine navigational equipment
- Command and control systems
- Radar and air defense systems
- Test, ground support, and training equipment
- Tanks, armored personnel carriers, and other military vehicles

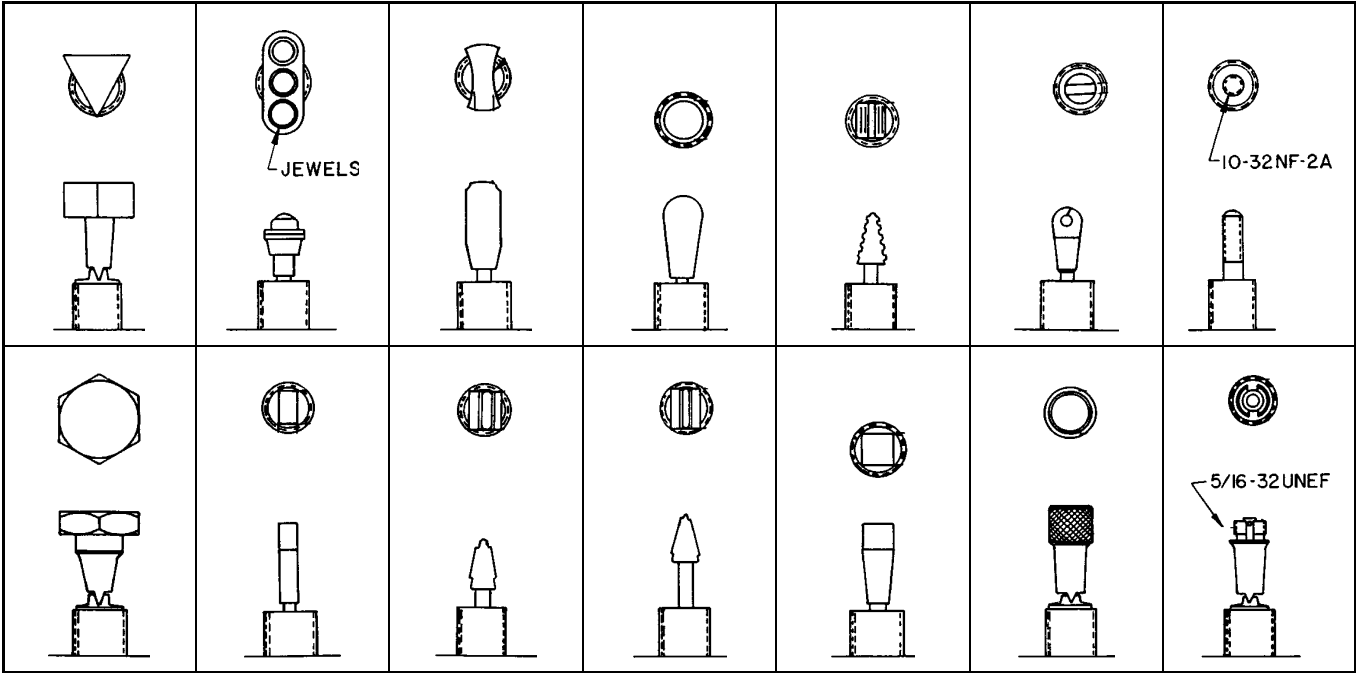
POSSIBLE VARIATIONS

In addition to the contact arrangements shown in the order guide, IWTS switches can be furnished with all the Series TL combinations shown in order guides on the previous pages.

Pull-to-unlock toggle lever versions can be made available. Contact the 800 number.

SPECIAL TL LEVERS

Some of the lever variations available for TL toggle switches are shown below. They can also have the same colored tab levers furnished with TW toggle switches. For further information, contact the 800 number.






Manuals

Manual Switches




TL Series

Environment-Sealed Toggle Switches

TL 2-POSITION VERSIONS WITH IWTS TERMINATION ORDER GUIDE

	No. Poles	Circuit(s) Made With Toggle At:		Page 39		No. 16 Termination		No. 20 Termination	
		Keyway Position	Opposite Keyway	Electrical Rating Code	UL/CSA Rating Code	Catalog Listing	MIL Part No.	Catalog Listing	MIL Part No.
	1	OFF OFF* 1-2* 1-2 1-2*	2-3 2-3 OFF 2-3 2-3	1 2 2 1 2	L191 L192 L192 L191 L192	101TL1-2 101TL1-4 101TL1-6 101TL1-3 101TL1-8	MS27722-22 MS27722-29 MS27722-30 MS27722-23 MS27722-26	101TL2-2 101TL2-4 101TL2-6 101TL2-3 101TL2-8	MS27784-22 MS27784-29 MS27784-30 MS27784-23 MS27784-26
	2	OFF OFF* 1-2, 4-5* 1-2, 4-5 1-2, 4-5*	2-3, 5-6 2-3, 5-6 OFF 2-3, 5-6 2-3, 5-6	3 4 4 3 4	L191 L192 L192 L191 L192	102TL1-2 102TL1-4 102TL1-6 102TL1-3 102TL1-8	MS27723-22 MS27723-29 MS27723-30 MS27723-23 MS27723-26	102TL2-2 102TL2-4 102TL2-6 102TL2-3 102TL2-8	MS27785-22 MS27785-29 MS27785-30 MS27785-23 MS27785-26
	4	OFF OFF* 1-2, 4-5 7-8, 10-11* 1-2, 4-5 7-8, 10-11 1-2, 4-5 7-8, 10-11*	2-3, 5-6 8-9, 11-12 2-3, 5-6 8-9, 11-12 OFF 2-3, 5-6 8-9, 11-12 2-3, 5-6 8-9, 11-12	5 6 6 5 6	L191 L192 L192 L191 L192	104TL1-2 104TL1-4 104TL1-6 104TL1-3 104TL1-8	MS27724-22 MS27724-29 MS27724-30 MS27724-23 MS27724-26	104TL2-2 104TL2-4 104TL2-6 104TL2-3 104TL2-8	MS27786-22 MS27786-29 MS27786-30 MS27786-23 MS27786-26

TL 3-POSITION VERSIONS WITH IWTS TERMINATION ORDER GUIDE

	No. Poles	Circuit(s) Made With Toggle At:			Electrical Rating Code	UL/CSA Rating Code	No. 16 Termination		No. 20 Termination	
		Keyway Position	Center Position	Opposite Keyway			Catalog Listing	MIL Part No.	Catalog Listing	MIL Part No.
	1	1-2 1-2* 1-2*	OFF OFF OFF	2-3 2-3 2-3*	1 2 2	L191 L192 L192	101TL1-1 101TL1-5 101TL1-7	MS27722-21 MS27722-31 MS27722-27	101TL2-1 101TL2-5 101TL2-7	MS27784-21 MS27784-31 MS27784-27
	2	1-2, 4-5 1-2, 4-5* 1-2, 4-5*	OFF OFF OFF	2-3, 5-6 2-3, 5-6 2-3, 5-6*	3 4 4	L191 L192 L192	102TL1-1 102TL1-5 102TL1-7	MS27723-21 MS27723-31 MS27723-27	102TL2-1 102TL2-5 102TL2-7	MS27785-21 MS27785-31 MS27785-27
	4	1-2, 4-5 7-8, 10-11 1-2, 4-5 7-8, 10-11* 1-2, 4-5 7-8, 10-11*	OFF OFF OFF OFF	2-3, 5-6 8-9, 11-12 2-3, 5-6 8-9, 11-12 2-3, 5-6 8-9, 11-12*	5 6 6	L191 L192 L192	104TL1-1 104TL1-5 104TL1-7	MS27724-21 MS27724-31 MS27724-27	104TL2-1 104TL2-5 104TL2-7	MS27786-21 MS27786-31 MS27786-27

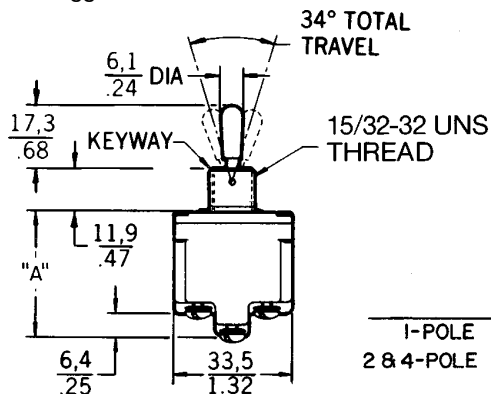
* These positions only are momentary. All others are maintained.

Manual Switches

TL Series

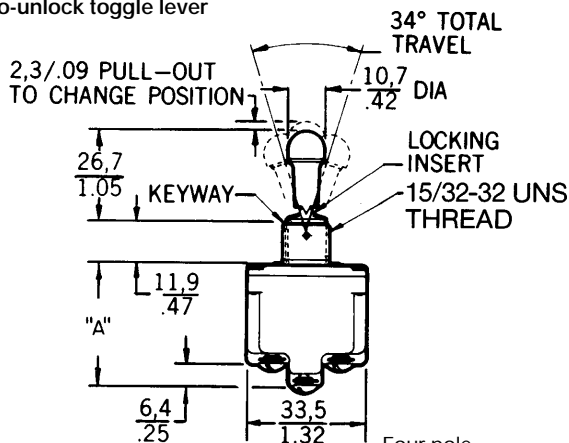
Environment-Sealed Toggle Switches

MOUNTING DIMENSIONS (For reference only)
Standard toggle lever



One pole

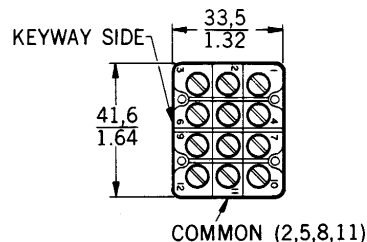
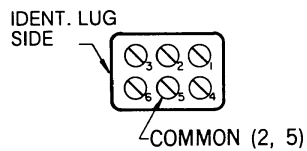
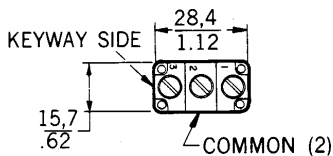
Pull-to-unlock toggle lever



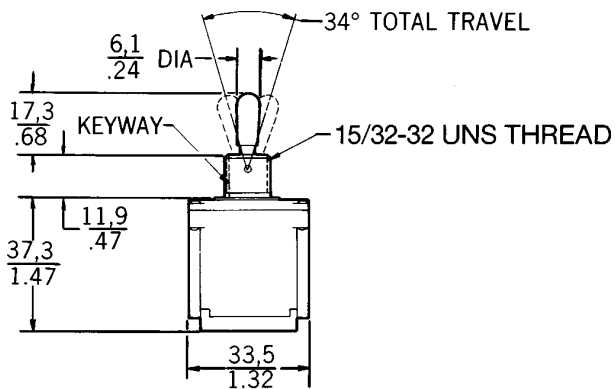
Four pole

	DIM. "A"
1-POLE	29,5 / 1.16
2 & 4-POLE	34,4 / 1.35

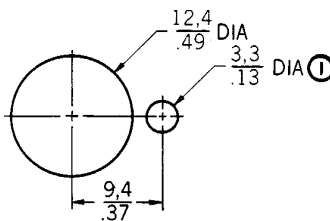
Two pole



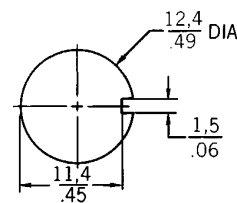
Standard toggle lever, IWTS termination



Panel cutout

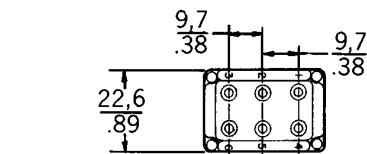


With locking ring



Without locking ring

Note:
1,4 / .06 Min deep to accommodate locking ring. (15PA87 panel seal requires blind hole to insure seal integrity.)



Note:
Terminal screws and mounting hardware (locking ring, lockwasher, and two hexnuts) are furnished unassembled.

Key: 0,0 = mm
0.00 = inches

Manuals